

## REMARKS

The applicant wishes to thank the Examiner for the careful attention paid to the many claims in this application and the clear presentation of the reasons for rejection.

The claims have been amended to eliminate objections to improper multiple dependency and to correct those instances of language indicating a definite article where there was not an independent indefinite article preceding a noun.

Claims 2, 4-14, 18-20, 33-36, 38-48, and 51-53 have been canceled, with reservation of the right to present them in a continuation application should that appear appropriate. The limitations of claim 3 have now been incorporated into claim 1 and claim 3 has been deleted.

The Examiner has rejected the claims on the basis of Breed (2002/0005778), Leonard (6,137,566), Camhi (5,430,432) and Lotito (6,129,168). The present invention is a system for collision avoidance. Breed provides disclosure of infrared light emitting components on a vehicle to make it aware of its environment. Although Breed makes reference to pulsed lasers and continuous lasers it is in connection with infra-red receiving means. For example at paragraph [0131] Breed states:

The light emitting means may comprise an array of laser diodes, a pulsed laser or a continuous laser beam directing infrared light in a line and mean for controlling the laser beam to change a direction of the infrared light.

The Examiner then combines Breed with Leonard, which describes general technology for a laser radar receiver. The assumption is that it would be obvious to incorporate this general technology into a device designed to determine the environment of an automobile. However, there is no disclosure in either reference that suggests the

combination. It only become apparent to do so in hindsight of the present application. Indeed Leonard has shortcomings that indicate it would not be combined in the manner suggested by the present invention.

The Examiner consistently quotes Leonard et al (US 6,137,566) as representative of all laser radar receivers. In fact Leonard teaches and claims a completely digital system whose main thrust is to obtain the intensity or the peak reflected laser pulse from multiple thresholding digital circuits located in each unit cell of the receiver array. These digital circuits are manifested in self resetting comparators, which switch when a threshold is exceeded, and as shift registers. Because it is unknown before transmitting the laser pulse how the thresholds should be set, many laser pulses are required to obtain the intensity. This is a shortcoming because it is desirable to obtain as much 3-D information as possible with a single laser pulse in high speed collisions. Leonard teaches that range precision is completely dependent on the speed of the digital shift registers and the length of the laser pulse. Leonard does not capture the pulse shape on analog circuitry such as capacitors and therefore cannot use knowledge of the pulse shape to increase the range precision above the total pulse length; pulse matching algorithms known to experts in the field can increase the range precision to small fractions of the pulse length. Furthermore by capturing the pulse shape the difficult task of fabricating a laser with a short pulse length as well as fabricating a very high speed shift register is avoided. Range precision is important for precisely identifying vehicle types and for precisely computing collision times. Capturing the pulse shape by means of sampling the pulse and storing the information on analog circuits, such as capacitors, further allows the pulse intensity to be captured with a

single laser pulse because the pulse shape includes the intensity. Since capacitors are orders of magnitude smaller than shift registers capturing the pulse shape by means of capacitors dramatically reduces the silicon real estate required for pixel circuitry allowing more pixels in the array and therefore a greater field of view or spatial resolution with a single laser pulse. A large field of view is desirable because more 3-D information can be captured in a shorter time and higher spatial resolution is desirable to enhance vehicle recognition and precisely compute collision parameters.

Nevertheless, the claims of the present application have been limited by reciting elements having no correspondence with either of these references. In particular, claim 1 as amended refers to a received information signal and its transfer to drive electronics. Claims 15-17, which depend from the amended claim 1, further recite means to develop data indicative of the flight time of the laser pulse including pulse shape sampling circuitry, Schmitt triggers and transimpedance amplifier circuitry. Leonard does not teach Schmidt Trigger circuits because the Schmidt Trigger is part of an analog amplifier circuit and not relevant to Leonard's digital device. Leonard does not teach offset correction circuitry because offset correction circuitry is required for analog signals and Leonard does not capture or output analog signals. Leonard does not teach integration because integration is an analog function and not relevant to the digital device of Leonard.

Claims 21-22 recites output electronics having gain and offset correction circuitry. Claims 23-32 recite output electronics means including circuitry for implementing range and time of impact calculations. Claim 37 recites a coefficient of friction indicator. Claims 48-50 recite a receiver for processing Doppler shifter laser or

microwave signals.

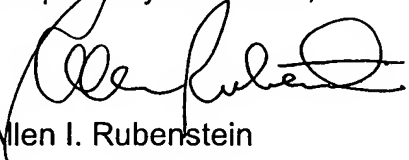
In contrast Stettner's specification teaches an analog based ladar system which samples the laser pulse storing the information on analog circuitry such as capacitors. A digital counter or analog clock (a ramp voltage) is stopped by means of an analog amplifier circuit, a Schmidt Trigger. The analog data is off set corrected to take account of variations in the analog circuits.

Thus each of the product claims remaining in the application now recites combinations of elements each of which is not to be found in the cited references, whose combination is in any event suggested only by hindsight.

For the reasons given, it is respectfully requested that the application as amended be allowed at this time.

The Examiner is authorized to charge any additional amount necessitated by this reply, including any charges for extensions of time to allow consideration of this or any future reply requiring a petition for an extension of time, to deposit account 07-1730. This authorization should be treated as a constructive petition for such extensions of time, if any, as are necessary. In calculating such fees please note that the Assignee of this application is a small entity.

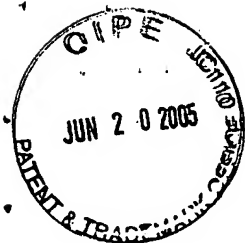
Respectfully submitted,



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CERTIFICATE OF MAILING

I hereby certify that the enclosed correspondence relating to patent application  
Serial No. 10/066,340, filed January 31, 2002, is being deposited with the United States  
Postal Service as First Class Mail in an envelope addressed to Commissioner for  
Patents, PO Box 1450, Alexandria, VA 22313-1450, on June 14, 2005.

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